

Zero Retries issue 0043 2022-04-22

Technological innovation in Amateur Radio - Data Communications; Space; Microwave... the fun stuff! The Universal Purpose of Ham Radio is to have fun messing around with radios - Bob Witte K0NR. Ultimately, amateur radio must prove that it is useful for society - Dr. Karl Meinzer DJ4ZC. We are confronted by insurmountable opportunities! - Pogo. Nothing great has ever been accomplished without irrational exuberance - Tom Evslin. Irrational exuberance is pretty much the business model of Zero Retries Newsletter - Steve Stroh N8GNJ. What's life without whimsy? - Dr. Sheldon Cooper.

Zero Retries is a unique, quirky little highly independent, opinionated, self-published email newsletter about technological innovation in Amateur Radio, for a self-selecting niche audience, that's free (as in beer) to subscribe.

About Zero Retries

Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor Emeritus

In this issue:

- Request To Send
- Follow-on - Thoughts on the Future of Amateur Radio
- Dear Matt and Gerald Youngblood
- Icom Japan SHF Project Volume 3 - "Hardware"
- Feedback Loop
- Join the *Fun* on Amateur Radio
- Closing The Channel

Request To Send

Countdown to [Hamvention](#) 2022 - May 20-22, in Xenia, Ohio:

24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 09 08 07 06 05 04 weeks...

Zero Retries readers, Thank You for your condolences on the death of Assistant Late Night Editor Jack Stroh. They were appreciated.

The cover of the [May, 2022 issue of ARRL's QST magazine](#) was "Zero Retries Interesting" - a large dish pointed skyward with the title "Shooting for the Moon". I assumed there would be an general article about Moonbounce / Earth-Moon-Earth (EME), but that "article" turned out to

be a passing mention of a contest.

That issue contained also a review of a product I've been imagining for some time - a small, low power portable HF radio for CW (Morse Code) only (no voice / data / Single Sideband support), but with an embedded encoder (from a keyboard) / decoder / display for CW. The [PreppComm DMX-40+ Morse Code Transceiver](#) provides all the benefits of CW - very power efficient, narrow transmitted bandwidth, very high signal to noise ratio (SNR)... without the need to know CW.

The DMX-40+ reminds me of a story I think that I read in 73 Magazine about a very experienced CW operator who, night after night, polled the HF bands for someone... *anyone*... who could operate CW commensurate with *his* advanced skills. One night he finally got a taker with a "good fist". Trying to best the newcomer, the veteran CW operator kept suggesting they go faster. No matter how fast the veteran CW operator transmitted, the other operator matched him. Finally the CW operator was at his limit, unable to transmit any faster. Now intensely curious, he asked the other operator what "key" he was using to operate so fast?

The reply was... "Commodore 64". Ah, technology...

de Steve N8GNJ

Follow-on - Thoughts on the Future of Amateur Radio

The most recent issues of Zero Retries begin with this declarative:

Zero Retries is a unique, quirky little highly independent, *opinionated*, self-published newsletter about technological innovation in Amateur Radio, for a self-selecting niche audience, that's free (as in beer) to subscribe.

A few readers seem to have taken offense at my article **Thoughts on the Future of Amateur Radio** in Zero Retries 0042. One reader in particular seems to think that I was criticizing Amateur Radio Operators who just want to enjoy themselves in Amateur Radio without assuming the "baggage" of emergency communication, promoting Amateur Radio to others, etc. Mostly, those readers seem to have taken offense of my descriptor "Old guys sitting in the basement tapping on a Morse Code key".

I wasn't criticizing "Old guys sitting in the basement tapping on a Morse Code key". There is nothing wrong with that activity. *Please carry on* all you "Old guys sitting in the basement tapping on a Morse Code key". Keep having your fun with that.

I think that those readers missed my larger point, or perhaps I didn't express it well. So, I'll try to do so here:

My assessment is that *if* Amateur Radio is to survive beyond the current generation, perhaps as soon as the end of this decade, it (collectively) needs to change... *somehow*... the *perception* in society that Amateur Radio *is only about* "Old guys sitting in the basement tapping on a Morse Code key".

It's my assessment that such a perception simply doesn't resonate with younger folks, not even nostalgically, and thus they're dismissive of Amateur Radio, and by extension its utility to society. They don't know (nor is it easy to discover) that Amateur Radio in the 2020s is now *much, much more* than just "Old guys sitting in the basement tapping on a Morse Code key".

Put it this way... how many instances in the media can you recall of "Old guys sitting in the basement tapping on a Morse Code key"? Probably several. Now, how many instances in the media can you recall of "Astronauts on the International Space Station using Amateur Radio"? Hopefully several, but maybe none. I'll guess that in the general public, the latter would be "none". In a nutshell, that's my larger point about public perception of Amateur Radio in this era.

Those of us who have been Amateur Radio Operators for decades sometimes assume that Amateur Radio has existed for a century, and there's no reason to think it won't continue to exist for another century. But, the *reality* is that Amateur Radio exists only at the whim (or perhaps ignorance) of lawmakers and regulators. Amateur Radio is a creation of regulation, *not* technology, *nor* personal rights. The stark reality is that Amateur Radio (and Amateur Radio Operators) *do not have a "right"* to operate Amateur Radio in certain portions of the electromagnetic spectrum. Amateur Radio Operators are granted a *privilege* to do so by each national government. And that privilege can be revoked... and *has been revoked in the past* to make way for other radio services and systems that are deemed by lawmakers and regulators to be of higher utility to society than Amateur Radio operations.

So, "Old guys sitting in the basement tapping on a Morse Code key", please continue to have your fun and enjoy Amateur Radio. In all likelihood those activities will continue to be available to you for the rest of your Amateur Radio career.

Just... please understand that some of us are thinking bigger thoughts about Amateur Radio still being available to use, enjoy, and learn from in the decades to come.

Dear Matt and Gerald Youngblood

Matt Youngblood KD5FGE is [President and CEO of FlexRadio](#). Gerald Youngblood K5SDR is the [creator](#) of the [SDR-1000](#) (which ["accidentally" launched FlexRadio](#)), and is now [Founder and Chairman of FlexRadio](#).

Dear Matt and Gerald:

I'm a fan of FlexRadio from the SDR-1000 days, but I'll not bury the lede here and come to the point:

Amateur Radio Operators in the US that are interested in experimentation and "... [\[contributing\] to the advancement of the radio art](#)" need a fully software-defined transceiver for VHF / UHF. I'm convinced that FlexRadio is the only company that could build one that's fully optimized for the US VHF / UHF bands.

Why do we need such a radio? *Because there's a lot we can't do without one.* As FlexRadio has amply demonstrated with the Flex-6xxx products, if you want to achieve the full potential

of Software Defined Radio, the [hardware supporting the software](#) must be up to the task.

One example is that we need a fully software-defined VHF / UHF radio for space use. There are new microsats, especially research microsats going into orbit seemingly ever week, and each one is a bit different from the last. Amateur Radio Operators working satellites are lashing together solutions with basic software defined receivers, transverters, external computer control, remote access of the computer, etc. But how much better would it be if there was a do-it-all fully software-defined, integrated VHF / UHF radio, with native remote access such as a VHF / UHF equivalent of a Flex-6xxx (Flex-VHF/UHF)? I can easily imagine that for every microsat program at a college, they would want to purchase multiple Flex-VHF/UHF units. With the standardization and capabilities of a Flex-VHF/UHF, there may well be a lot more “Ground Command” units deployed worldwide if such systems can easily be implemented with a Flex-VHF/UHF, dual axis rotor, and antenna, with built-in *full-capability* remote access.

Another example is that we now have a plethora of incompatible digital voice modes on VHF and UHF - P25, DMR, YSF, D-Star, FM of course, and even some CODEC 2 and the bleeding edge [M17 Project](#). How cool would it be to monitor, and be able to use, *all the repeaters in your area*, no matter the mode? That would be trivial for a Flex-VHF/UHF.

Yet another example is remote Amateur Radio stations based on FlexRadio units are going into Amateur Radio clubs to be shared with club members and especially demonstrated to new hams. How cool would it be to do the same thing with VHF / UHF radios for local and space use?

Data, DATA, DATA!

The genesis of this request is the amazing data performance that EA5HVK has been able to accomplish with [VARA FM](#) for VHF / UHF. VARA FM occupies a 20 kHz FM channel, and operating purely in the audio domain, is able to achieve up to 25 kbps, with robust performance. All of the sudden, Amateur Radio data communications over VHF / UHF is interesting again, with reasonable data rates and much higher reliability.

With VARA FM as a baseline, imagine if we did have a Flex-VHF/UHF that can manipulate a radio channel between 6.25 kHz, to 100 kHz and everything in between. 20 years ago the [Icom ID-1](#) was able to deliver 128 kbps in a 100 kHz channel in the 1240-1300 MHz band (“DD” mode). DD mode is also included in the Icom IC-9700, but in polling folks that have an IC-9700, almost no one uses it, at least in the US. Icom also came out with a [new 1240-1300 MHz repeater](#), so there’s apparently some demand. Imagine what could be done with a Flex-VHF/UHF using current technology such as OFDM, Forward Error Correction, dynamic modulation index, and other modulation methods... along with backwards compatibility in software with DD mode?

Another interesting software defined transceiver project for Amateur Radio VHF / UHF is the [RPX-100](#), but it’s a research project, and will only operate on the 50 MHz, 144 MHz, and 440 MHz bands - not 222 or 1240 bands.

At the moment, we have to contend with an artificial limit in the FCC rules about maximum data rate of 56 kbps no matter that we can do much, much better than that, such as the ID1 and [New Packet Radio](#) (500 kbps in a 100 kHz channel). See below for an idea on how to move

forward on that issue.

Yes, it's possible to use the (admittedly awesome) [Q5 Signal 5BVUXHP 5-Band High Power VHF/UHF Transverter](#) with a Flex-6xxx series radio. As I wrote in Zero Retries 0034, that combination will be *my* personal path to **Data, DATA, DATA!** when I “dive deep” into HF and more intense experimentation at VHF / UHF in 2023. But there are a *lot* of us whose primary interest in experimenting in Amateur Radio is VHF / UHF, thus having to invest in a highly capable 100 watt transmit HF radio as a “front end” for the VHF / UHF transverter is conceptually a non-starter, and less affordable.

Why does *FlexRadio* need to be the one to build such a radio? *Because no other company can!* No other US Amateur Radio manufacturer has the same engineering, manufacturing, and especially software capabilities as FlexRadio. The Japanese Amateur Radio manufacturers aren't going to do it - they can't even support the US 222-225 MHz band. The Chinese Amateur Radio manufacturers aren't going to create brand new technology - they copy and iterate at the edges, with (effectively) no customer support.

Only a US manufacturer of Amateur Radio products can understand the relative wealth of VHF and UHF bands that US Amateur Radio Operators have access to, and thus the potential of such a radio. US manufacturers have the luxury of their entire staff - especially marketing, design, and manufacturing, understanding (living in) the US market and the potential here. I have talked to US representatives of Japanese manufacturers and they readily concede that they could sell a lot of radios that are specifically designed for the US market (including the once-popular 144 / 222 / 440 MHz combination), but now they can no longer interest those Japanese companies in designing a radio intended solely for the US market.

Second, FlexRadio, more than any other Amateur Radio manufacturer, is all-in on Software Defined Radio technology. I often make the analogy in Zero Retries that FlexRadio is all-in on Software Defined Radio technology like Tesla is all-in on battery electric vehicles, and that comparison is not casual. Both FlexRadio and Tesla are companies that identified a paradigm shift in technology in their respective industries, and went all-in on that new technology when the conventional wisdom of the incumbents in their respective industries is “go slow”.

FlexRadio manufactures its products in the US. That makes it flexible and it adaptable to changing capabilities and requirements, especially because their products are mostly software-based.

Eventually there will be Amateur Radio modes that go beyond the current rigid, antiquated modes, and hopefully some organization, such as [TAPR did with Spread Spectrum](#), can establish a Special Temporary Authority (STA) with the FCC, and FlexRadio units, being software based, can more easily accommodate such STAs (perhaps even ensuring, in software, that the enhanced capabilities under the STA are enabled for a limited time).

The Economics - Bottom Line One interesting trend in US Amateur Radio is that some progressive Amateur Radio clubs are seeing a revitalization in membership because of the economics of sharing Amateur Radio stations via Internet. This has largely been made possible by FlexRadio's technology - private (club) implementations of what [Remote Ham Radio](#) is doing. I'll guess that there are a *lot* of clubs and other radio sharing arrangements that would pay the early premium of a Flex-VHF/UHF to add VHF / UHF capability their club's remote

systems. In fact, I bet there would be a burst of *new* such radio sharing arrangements *specifically* for VHF / UHF. Imagine putting such a system on a quiet hill to be able to monitor (and transmit) on all the US VHF UHF bands - 50-54 MHz, 144-148 MHz, 222-225 MHz, 420-450 MHz, and 1240-1300 MHz.

And of course there is the “build it and they will come” effect that FlexRadio saw from commercial customers in the aftermath of the SDR-1000. I suspect FlexRadio will find VHF / UHF radios to be an even more lucrative niche with commercial and government customers than HF radios.

Yes, as much as FlexRadio had to stretch the state of the art in the Flex-6xxx series to do direct conversion, and it will be even more difficult to do so with a Flex-VHF/UHF, but just because something is hard doesn't mean it shouldn't be attempted. Imagine the worldwide lead that FlexRadio will have if it is able to create a Flex-VHF/UHF, and then eventually ramp up the volume and lower the cost.

Matt and Gerald, *please consider* the creation of a Flex-VHF/UHF. It's a product whose time has come, especially here in the US, and I believe FlexRadio is the only company that could make it a reality.

Thanks, Steve Stroh N8GNJ

I'm not going to stalk Matt and Gerald... but if I do manage to come face to face with them at Hamvention in a few weeks, I'm going to have a hardcopy of this article with me to hand to them, along with my full contact information.

Icom Japan SHF Project Volume 3 - “Hardware”



Icom “SHF-P1” (design sketch) - Image courtesy of Icom, Inc.



Icom SHF Project Outdoor Unit - Image courtesy of Icom, Inc.

Speaking of new paradigm Amateur Radio systems we'd like to see become a reality, [Icom Japan's Super High Frequency \(SHF\) Project, Volume 3](#) has been released with some concept illustrations of the hardware. I've related the previous two installments of this project in previous issues (Volume 1 in Zero Retries 0024, and Volume 2 in Zero Retries 0035). Apparently the illustration of "hardware", however preliminary, has really animated a lot of Amateur Radio Operators. One of the primary venues of rabid speculation for the "SHF Project" is a new mailing list (<https://groups.io/g/icom-shf>) that was spun out of a similar list for the Icom IC-9700.

As I understand what is stated in this installment, these two units are artist conceptions (design sketch), hardware mockups, or at best, prototypes. This project / product doesn't seem (to me) to be "close to launch" yet.

Icom has been describing the broad outlines of the "SHF Project" for months now - a control head (labeled SHF-P1 on the graphic) with no radio hardware, data and power over a cable (perhaps even standardized Power Over Ethernet), and a radio unit on a pole or mast, with very short feedlines to the antennas. In this latest installment, the control head is modeled on the [Icom IC-705](#) portable radio, and the radio unit is a nice, possibly die cast aluminum box... with antenna connectors and a cable to the control head. One new detail is that the radio unit will apparently include both 2.4 GHz and 5.x GHz radios. Until now it was unclear if there would be separate 2.4 GHz and 5.x GHz units or if both bands would be included in the same unit.

Another new detail seems to be that Icom will treat the 2.4 GHz and 5.x GHz bands as "just another Amateur Radio band", rather than "fixed wide channel" data such as Wi-Fi (or Icom's 100 kHz channel 128 kbps Digital Data mode). As you can see on the "SHF-P1", there's a VFO mode, a spectrum display, and the unit is "configured" for Upper Sideband (USB). That's an

interesting approach that I've never seen in a 2.4 / 5.x GHz unit (though, of course, it's always been possible using transverters with Amateur Radio VHF / UHF all mode radios).

I'll speculate that one motivation for developing this radio is the geostationary [QO-100 Amateur Radio payload](#) that's accessible from the Eastern Hemisphere, whose uplink and downlinks are:

Narrowband Linear transponder (250 kHz):

2400.050 - 2400.300 MHz Uplink

10489.550 - 10489.800 MHz Downlink

Wideband digital transponder (8 MHz):

2401.500 - 2409.500 MHz Uplink

10491.000 - 10499.000 MHz Downlink

It's (further) pure speculation on my part, but it seems feasible for Icom to offer a couple of accessories for the "SHF" to be able to use QO-100:

- 2.4 GHz power amplifier (power required is dependent on gain of antenna system and which transponder; the Wideband transponder will require more power).
- Relatively simple, inexpensive 10 GHz to 5 GHz receive transverter.

I hope Icom will incorporate maximum flexibility into this system, to accommodate wide channels (such as QO-100's Wideband digital transponder), and Software Defined Radio technology, and especially user-controllable (open source) Software Defined Radio modes. If Icom has the courage to do so, the "SHF" could be a fun unit for fans of VHF / UHF / Microwave to play with, and (hopefully) us "dataheads" who like to experiment with advanced data communications.

Per Icom: *This prototype model will be displayed at the Dayton Hamvention in Ohio, USA from 20th May 2022.*

Thus, I'll be there in the Icom booth at Hamvention, laying hands-on the plexiglas cube that will inevitably be protecting it from the teeming hordes, and of course, I too will record the obligatory selfie to prove "*I saw it way back when*".

Thank you Icom for offering at least one "Zero Retries Interesting" product, er, *concept* at Hamvention 2022.

Feedback Loop

Substack, the platform I use for publishing Zero Retries, keeps improving. There is now a dedicated URL that I can link to in Feedback Loop in lieu of reprinting the comments in the body of Zero Retries.

Several readers provided interesting comments on Zero Retries 0042, and I'm grateful for their feedback!

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out **Join the Fun on Amateur Radio** for some pointers.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with wireless technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to anyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing *Thanks* to:

- Tina Stroh KD7WSF for, well, *everything*!
- Pseudostaffers [Dan Romanchik KB6NU](#) and [Jeff Davis KE9V](#) for continuing to spot, and write about “Zero Retries Interesting” items on their respective blogs that I don’t spot on my own.
- [Southgate Amateur Radio News](#) consistently surfaces “Zero Retries Interesting” stories.
- The [Substack email publishing platform](#) makes Zero Retries possible. I recommend it for publishing newsletters.

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More bits from Steve Stroh N8GNJ:

- [SuperPacket blog](#) - *Discussing new generations of Amateur Radio Data Communications - beyond Packet Radio (a precursor to Zero Retries)*
- [N8GNJ blog](#) - *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs - Bellingham, Washington, USA*

Thanks for reading!

Steve Stroh N8GNJ / WRPS598 (He / Him / His)

These bits were handcrafted in beautiful Bellingham, Washington, USA

2022-04-22

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